Name: Date:

Exam: Function Reflections (Solution version 26)

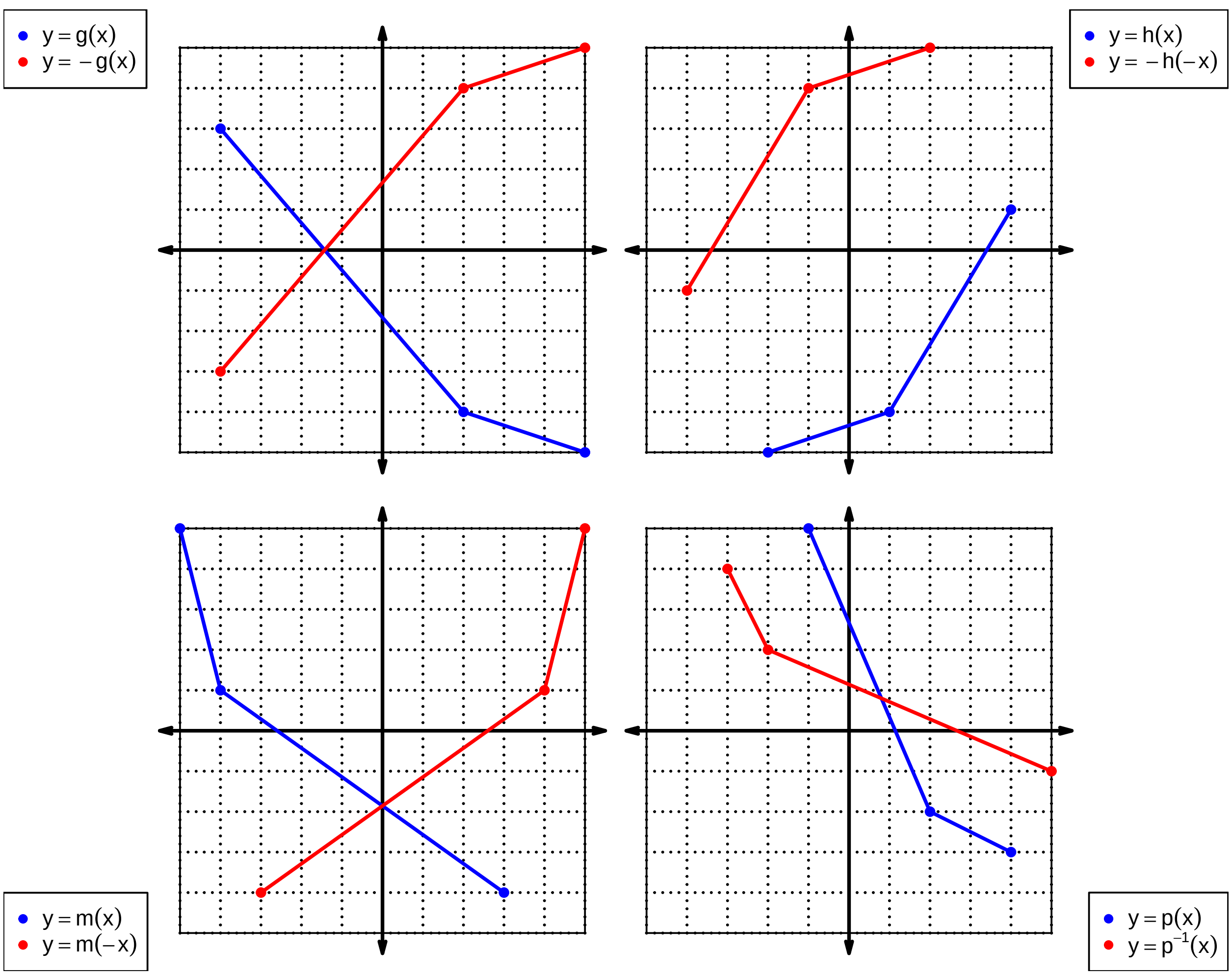
1. Let function f be defined by the polynomial below:

$$f(x) \;=\; 5x^5 + 8x^4 + 4x^3 + 7x^2 + 2x + 6$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials
$-f(x)$	$-5x^5 - 8x^4 - 4x^3 - 7x^2 - 2x - 6$
$f(-x)$	$5x^5 - 8x^4 + 4x^3 - 7x^2 + 2x - 6$
$-f(-x)$	$-5x^5 + 8x^4 - 4x^3 + 7x^2 - 2x + 6$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



Exam: Function Reflections (Solution version 26)

For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	1	4	6
2	6	5	7
3	5	2	1
4	8	9	9
5	2	6	8
6	7	3	4
7	4	8	5
8	9	1	3
9	3	7	2

3. Evaluate $h(9)$.

$$h(9) = 2$$

4. Evaluate $f^{-1}(4)$.

$$f^{-1}(4) = 7$$

5. By filling more rows of the table, it is possible to make function g **even**. If that were done, what would be the value of $g(-3)$?

If function g is even, then

$$g(-3) = 2$$

6. By filling more rows of the table, it is possible to make function f **odd**. If that were done, what would be the value of $f(-1)$?

If function f is odd, then

$$f(-1) = -1$$

Exam: Function Reflections (Solution version 26)

7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) \ = \ -x^3 - x$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$\begin{aligned} p(-x) \ &= \ -(-x)^3 - (-x) \\ p(-x) \ &= \ x^3 + x \end{aligned}$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$\begin{aligned} -p(-x) \ &= \ -\left(x^3 + x\right) \\ -p(-x) \ &= \ -x^3 - x \end{aligned}$$

   c. Is polynomial p even, odd, or neither?

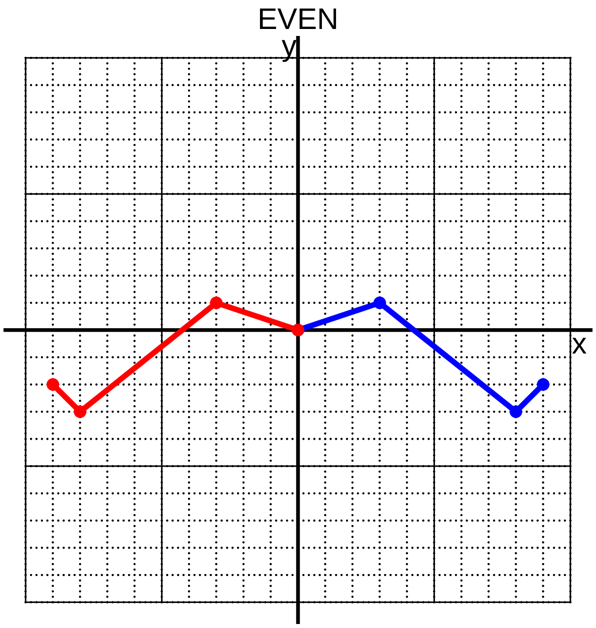
   odd

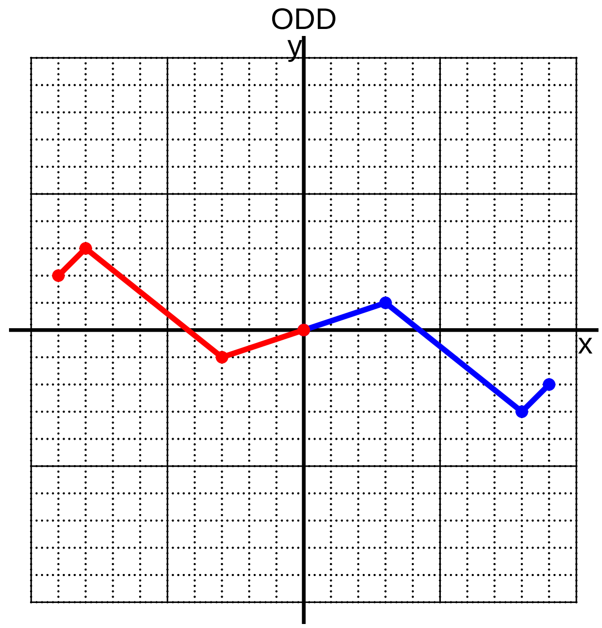
   d. Explain how you know the answer to part c.

   We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

Exam: Function Reflections (Solution version 26)

8. I have drawn half of a function. Draw the other half to make it even or odd.





9. Let function f be defined with the equation below.

$$f(x) = 6(x-2)$$

a. Evaluate $f(7)$.

step 1: subtract 2
step 2: multiply by 6

$$f(7) = 6((7)-2)$$
$$f(7) = 30$$

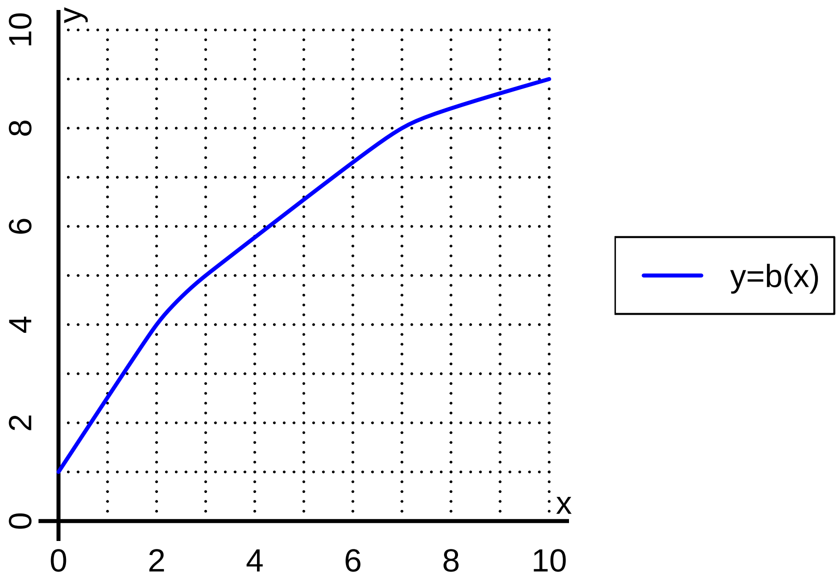
b. Evaluate $f^{-1}(18)$.

step 1: divide by 6
step 2: add 2

$$f^{-1}(x) = \frac{x}{6} + 2$$
$$f^{-1}(18) = \frac{(18)}{6} + 2$$
$$f^{-1}(18) = 5$$

Exam: Function Reflections (Solution version 26)

10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(2)$.

$$b(2) \ = \ 4$$

b. Evaluate $b^{-1}(8)$.

$$b^{-1}(8) \ = \ 7$$

Exam: Function Reflections (Solution version 26)

11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	3	-3	-3	3
-1	9	-9	9	-9
0	0	0	0	0
1	9	-9	9	-9
2	-3	3	3	-3

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.